

# PATENT COOPERATION TREATY



## PCT

### INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY (Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

REC'D 0 2 MAR 2005

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Applicant's or agent's file reference WO 21.1039	<b>FOR FURTHER ACTION</b>		See Form PCT/PEA/416
International application No. PCT/EP2004/004918	International filing date (day/month/year) 22.03.2004	Priority date (day/month/year) 03.04.2003	
International Patent Classification (IPC) or national classification and IPC G01N29/10, G01V1/50			
Applicant SERVICES PETROLIERS SCHLUMBERGER ET AL.			
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 5 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input type="checkbox"/> sent to the applicant and to the International Bureau) a total of sheets, as follows:</p> <p><input type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>			
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the opinion</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the international application</p>			
Date of submission of the demand  22.10.2004		Date of completion of this report  03.03.2005	
Name and mailing address of the International preliminary examining authority:  European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016		Authorized Officer  Kouzelis, D  Telephone No. +31 70 340-2954 	

**INTERNATIONAL PRELIMINARY REPORT  
ON PATENTABILITY**

International application No.  
PCT/EP2004/004918

**Box No. I Basis of the report**

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
  - ☐ publication of the international application (under Rule 12.4)
  - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements\*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

**Description, Pages**

1-11 as originally filed

**Claims, Numbers**

1-4 as originally filed

**Drawings, Sheets**

1/5-5/5 as originally filed

☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to sequence listing (*specify*):

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to sequence listing (*specify*):

\* If item 4 applies, some or all of these sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY REPORT  
ON PATENTABILITY**

International application No.  
PCT/EP2004/004918

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**Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

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**1. Statement**

Novelty (N)	Yes: Claims	1-4
	No: Claims	
Inventive step (IS)	Yes: Claims	1-4
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-4
	No: Claims	

**2. Citations and explanations (Rule 70.7):**

**see separate sheet**

**Re Item V**

**Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

Reference is made to the following document:

D1: US-A-6 041 861 (STANDLEY THOMAS ET AL) 28 March 2000 (2000-03-28)

1. The document D1 is regarded as being the closest prior art to the subject-matter of claim 1 and shows a method for determining components of a tube casing by measuring attenuation of acoustic waves by inverting a system of equations.
- 2.1 The subject-matter of claim 1 differs from this known D1 in that it calculates the unknown value  $\varphi_D$  that is the percentage of the cement de-bonded by inverting a system of three equations and three unknowns, after having first measured attenuation of acoustic waves in a free pipe, in a fully cemented pipe and in fully de-bonded pipe.
- 2.2 In contrast, D1 uses a ten step method that includes the determination of peak amplitudes and a FFT of the above amplitudes that leads to the inversion of nine equations (see Figures 6A and 6B, Col 8, lines 34-35).
- 2.3 The subject-matter of claim 1 is therefore new (Article 33(2) PCT).
- 3.1 The problem to be solved by the present invention may be regarded as how to determine  $n_D$  that is the percentage of the cement de-bonded from the tube casing, by measuring attenuation of acoustic waves in a pipe under real conditions.
- 3.2 The solution to this problem proposed in claim 1 of the present application is considered as involving an inventive step (Article 33(3) PCT) as it first measures attenuation of acoustic waves under three different (but known) conditions (free-pipe, fully bonbed pipe and fully de-bonded pipe) then measure attenuation of the waves under real (unknown) conditions and then inverts a system of three

equations in which the three unknowns are the three percentages  $n_C$ ,  $n_W$ ,  $n_D$ .

4. Independent claims 2 and 3 are also based on the central distinctive feature of claim 1, that is the inversion of the three equations system for determining the unknown  $n_D$ , but applies to measurement of a coupling amplitude, respectively the combination of attenuation and coupling amplitude. For the same reasons given above they also meet the requirements of the PCT with respect to novelty and inventive step.
5. The same consideration applies for the dependent claim 4.
6. The method finds industrial applicability in the field of tube casings in boreholes.